

3. Biological sabotage in World War I

MARK WHEELIS*

I. Introduction

The state of medical microbiological knowledge was quite advanced by the beginning of World War I. The aetiologic agents of most of the major bacterial diseases had been isolated in pure culture and studied. Viral diseases (although themselves not well understood) had been distinguished from bacterial and parasitic diseases. Modes of transmission were well understood for many agents, and public health countermeasures were widely implemented. Vaccines for a variety of human and animal diseases had been devised, and immune prophylaxis was available for others. In this great intellectual and medical revolution, in the period from about 1880, German and French scientists, physicians and veterinarians played a leading role. This pre-eminence was a matter of considerable national pride in both countries. Perhaps this provides a partial answer to the question why Germany and France seem to have been the first nations to investigate the potential of biological warfare.

Germany's first biological warfare effort was an ambitious World War I programme of biological sabotage (1915–18), most extensive against neutral suppliers of the Allied Powers but with attempts against belligerents as well. All known incidents were directed against draft, cavalry and military livestock; there were no known attempts to infect humans. While there was certainly a significant risk of human casualties as a result of biological attack on animals—the diseases used could also infect humans—none were recorded.

Such a programme must have been preceded by a period of research and development (R&D), either by the army alone or jointly with the academic microbiology and veterinary communities. No documentation of the R&D period has yet been found.

The biological sabotage was part of a broader programme of sabotage begun, and most extensive, in the USA during the period prior to its entry into the war.¹ Other principal venues of biological sabotage were Argentina, Romania, Norway and probably also Spain; attempts at biological sabotage on the Western front failed. Principal sources documenting the biological sabotage

¹ Landau, H., *The Enemy Within: The Inside Story of German Sabotage in America* (G. P. Putnam's Sons: New York, 1937); and Witcover, J., *Sabotage at Black Tom: Imperial Germany's Secret War in America, 1914–1917* (Algonquin Books: Chapel Hill, N. C., 1989).

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programme are:² records of the Mixed Claims Commission³ (NAS Record Group 76); records of the Bureau of Investigation⁴ (NACP Record Group 65); records of the US Military Intelligence Division (NAW Record Group 165); records of the US State Department (NACP Record Group 59); British Naval Intelligence sources (PRO Adm 137 and FO 371).

It is clear that the German programme of biological sabotage was the most ambitious and sustained of the war. However, France appears to have also had a programme of clandestine biological attack on military animals. This is suggested by German documents and now confirmed by material from the French archives at le Bouchet (see section IX). Further research is needed to determine the scope and nature of this programme.

II. The German biological sabotage programme: background

The biological sabotage programme was directed by the General Staff of the German Army, a unit consisting of several hundred officers who oversaw officer training, studied military history, developed strategy, prepared operations plans and implemented all army operations.⁵ It was essentially independent of civilian oversight, subject only to the Supreme Command and headed by the Kaiser. After mobilization, the General Staff acted as a field staff, leaving behind the Deputy General Staff in Berlin. Intelligence and covert operations were handled by Department IIIB, of which there were initially two separate versions (one with the General Staff and one with the Deputy General Staff in Berlin, the Deputy Department IIIB). The programmes discussed here were administered by the Political Section of Deputy Department IIIB. The Director of the Political Section for most of the period covered here (September 1914–July 1916) was Captain Rudolf Nadolny, whose responsibilities were described as information on foreign policy (in which capacity he had liaison with the Foreign Office⁶), operations and covert activities in foreign countries. Apparently in December 1915, Captain Nadolny and his responsibilities were trans-

² List of archives used: BAMA: Bundesarchiv Militärarchiv, Freiburg/Breisgau; KA: Kriegsarchiv, Munich; NAW: US National Archives, Washington, DC; NAS: US National Archives, Suitland, Md.; NACP: US National Archives, College Park, MD; PAAA: Politisches Archiv des Auswärtigen Amts, Bonn; PRO: Public Records Office, Kew, UK, and FO: Foreign Office, UK.

Note: all documents from German Government archives were generously provided by Erhard Geissler. See also Geissler, E., 'Anwendung von Seuchenmitteln gegen Menschen nicht erwünscht' [The use of epidemic agents against human beings not welcome], *Militär-geschichtliche Mitteilungen*, vol. 56, no. 2 (1997), pp 107–55.

³ The Mixed Claims Commission was a tribunal charged with adjudicating US claims against the Central Powers (Austria-Hungary, Germany and Turkey) for monetary damages arising from World War I. The process was lengthy, and the sabotage claims were not finally resolved until 1939 (other claims had been settled by 1933). Hall, W. R. and Peaslee, A. J., *Three Wars with Germany* (G. P. Putnam's Sons: New York, 1944); and Ulibarri, G. S. and Heppner, F. J., 'Preliminary inventory of records relating to United States claims against the Central Powers (Record Group 76)' (US National Archives: Washington, DC, 1962).

⁴ Predecessor of the Federal Bureau of Investigation.

⁵ Goerlitz, W., *History of the German General Staff* (Praeger: New York, 1953); and Cron, H., *Die Organisation des deutschen Heeres im Weltkrieg* [The organization of the German Army during the world wars], *Forschungen und Darstellungen aus dem Reichsarchiv*, vol. 5 (E. S. Mittler & Sohn: Berlin, 1923), p. 208.

⁶ Nadolny would have been ideal for this role, as he had formerly been with the Foreign Office until he was called up from the reserves.

ferred from the Deputy General Staff to the General Staff itself, although they remained physically in Berlin.⁷

The programme of biological sabotage was implemented despite the clear General Staff position that biological warfare was illegal. The 1902 General Staff handbook on land war (not supplanted before or during World War I) states that ‘certain means of war which lead to unnecessary suffering are to be excluded. To such belong: The use of poison both individually and collectively (such as poisoning of streams and food supplies) . [;] . the propagation of infectious diseases’.⁸

Although the legal foundation for the various restrictions mentioned by the General Staff in this handbook are not identified, one source was clearly Article 23 of the Convention Respecting the Laws and Customs of War on Land of 1899 and 1907 (which states that ‘ . . . it is especially prohibited . . . to employ poison or poisoned arms’).⁹ The General Staff interpretation is consistent with prior thinking on the matter; the 1899 Hague Convention adopted its ban on poison and poisoned weapons from the earlier (but unratified) Brussels Declaration of 1874, an early draft of which included the prohibition as well of ‘the spreading, by any means whatsoever, of disease on enemy territory.’ This was removed from later drafts because some delegates believed that it was redundant with the prohibition on poison and poisoned weapons.¹⁰

Probably the German General Staff of the early years of World War I interpreted the Hague Convention and the handbook as prohibiting anti-human biological warfare only. Consistent with this interpretation, Berlin denied permission for anti-human biological warfare on at least two occasions in 1916 (when the anti-animal sabotage programme was well under way). According to Beesly’s history of British Naval Intelligence, the German Legation in Madrid cabled Berlin in June:

In order to close the Spanish–Portuguese frontier and to make communications difficult between Portugal and the Allies, I [probably either the Military Attaché Korvettenkapitän Krohn, or the ambassador Prince Ratibor] suggest contaminating at the frontier, with cholera bacilli, rivers flowing through Portugal.¹¹ Professor Kleine of the Cameroons¹² considers the plan to be perfectly feasible. It is necessary to have two glass phials of pure culture, which please send when safe opportunity occurs.¹³

⁷ Gempp, ‘Geheimer Nachrichtendienst und Spionageabwehr der Heeres’ [The army’s secret intelligence service and counter-espionage service], part II, vol. 7, annex 3, no date, BAMA RW 5/v 47; and Nadolny, R., Eidesstattliche Aussage in der Klagesache der Lehigh Valley Railroad Co. und der Agency of Canadian Car & Foundry Comp. Ltd. gegen die deutsche Regierung [Confession under oath in the case brought by the Lehigh Valley Railroad Co. and the Agency of Canadian Car & Foundry Comp. Ltd. against the German Government], Amtsgericht Berlin-Mitte, PAAA R 95279, 16 Oct. 1928, pp. 1–9.

⁸ Morgan, J. H. (ed.), *The War Book of the German General Staff: Being ‘The Usages of War on Land’ Issued by the Great General Staff of the German Army* (McBride, Nast & Co.: New York, 1915), p. 86; a translation of Grosser Generalstab, Kriegsgeschichtliche Abteilung I (ed.), *Kriegsbrauch im Landkriege*, Kriegsgeschichtliche Einzelschriften, no. 31 (Ernst Siegfried Mittler und Sohn: Berlin, 1902), p. 10.

⁹ *Laws and Customs of War on Land; Annex to the Convention: Regulations Respecting the Laws and Customs of War on Land*, The Hague, 29 July 1899 and 18 Oct. 1907. Text from Friedman, L. (ed.), *The Law of War: A Documentary History* (Random House: New York, 1972), pp. 221–35, 308–23.

¹⁰ Brungs, B. J., ‘Status of biological warfare in international law’, *Military Law Review*, vol. 24 (1964), pp. 47–95; and Thomas, A. V. W. and Thomas, A. J., Jr, *Legal Limits on the Use of Chemical and Biological Weapons* (Southern Methodist University Press: Dallas, Tex., 1970).

¹¹ Portugal joined the Allies in 1916; Spain was neutral.

¹² The Allied campaign in Cameroon had driven the German forces out; many had received asylum in the Spanish colony of Muni, and spent the war interned in Spain.

¹³ Beesly, P., *Room 40: British Naval Intelligence 1914–18* (Hamish Hamilton: London, 1982), p. 201.

The German Government replied the next day denying permission.

In September 1916 Oberstabsarzt (captain and physician) Winter, Sanitation Officer of the 21st Army Corps, proposed Zeppelin airdrops of plague bacilli on England. His rather hare-brained scheme, promoted with great zeal, was to decant liquid cultures of plague bacilli from Zeppelins onto the ports, 100 litres at a time, with the aim of infecting rats and thereby initiating an epidemic. The Surgeon General's office (to which the matter had been referred by the General Staff) rejected the proposal on 24 September on both ethical and technical grounds, commenting to Winter, 'My dear Stabsarzt, all respects to your courage and patriotism, but if we undertake this step we will no longer be worthy to exist as a nation'.¹⁴

These were apparently not the only such rejections of anti-human biological warfare on principle. Professor Friedrich Konrich of the Royal Prussian War Ministry had to deal on several occasions with suggestions for the use of pathogens as weapons. He asserted, 'it has to be strongly emphasized that the War Ministry never of its own accord considered the idea [of anti-human biological warfare]. The people, however, repeatedly submitted such proposals to the government. As with other proposals they were thoroughly discussed and evaluated—with the result that the use of pathogens as weapons was completely rejected, categorically and regularly'. Konrich indicated that these proposals were rejected for both moral and technical reasons. The latter included the concern that such weapons would act too slowly and uncertainly and that they would endanger German troops nearly as much as enemy troops.¹⁵

This principled rejection of anti-human biological warfare occurred during active implementation by the German General Staff of a widespread programme of biological attack on animals in neutral and enemy territories. It is unclear from the record how the moral and legal issues were resolved; it is likely that the General Staff considered its programme, targeting as it did military supplies rather than enemy soldiers, to be consistent with the 1907 Hague Convention. A 1964 examination of the legality of biological warfare concluded that 'The employment of anti-crop and anti-animal biological agents for siege purposes would be lawful to the same extent as the use of land or sea blockades';¹⁶ it is likely that the General Staff thought similarly in 1914. Other countries have since come to the same conclusion; for instance, during World War II the USA concluded that offensive use of anti-plant agents against Japan would be merely an extension of accepted military practice, and therefore legal.¹⁷

Other legal issues were, of course, raised by the commission of acts of sabotage on the territory of neutral countries. Such acts were clear violations of the rights of those countries, as established by the two conventions on the rights

¹⁴ Winter, 'The past and the future: reflections on the pros and cons of bacterial warfare', 1942, in Alsos Mission, 'Translation of German folder of official directives and correspondence on BW', C-H/303, 1945, pp. 54–63.

¹⁵ Konrich, 'Krankheitserreger als Kampfmittel im Kriege? Bemerkungen zu dem Artikel von A. Lusztiig "Der Bakterienkrieg"' [Pathogens as weapons in war? Comments on the article by A. Lusztiig 'Bacteriological warfare'], *Zeitschrift für Desinfektions- und Gesundheitswesen*, vol. 23, no. 6 (1931), pp. 268–74.

¹⁶ Brungs (note 10).

¹⁷ See chapter 11 in this volume. Note that all of these opinions predated the 1972 Biological and Toxin Weapons Convention. It would be difficult to reach the same conclusion now.

and duties of neutral powers in land war and in naval war.¹⁸ Both contain clauses that permit neutral powers to export war *matériel* to belligerents, subject to the requirement that any restrictions on such trade must be applied equally. However, the British naval blockade gave the Allied Powers such a huge trade advantage that Germany must have believed that its sabotage programme was justified as a means of countering that advantage under the doctrine of *Kriegsraison*—military necessity—for which the German military had a long history of enthusiasm.¹⁹

These issues must have been confronted by the German Army and the Foreign Office, since the biological sabotage programme was a major operation. It required significant resources, involvement of the German diplomatic and consular corps as couriers of pathogenic microbes and as spymasters, occasional U-boat missions and was overseen directly by the General Staff. Given the magnitude of the programme, explicit consideration of its legal status could not have been avoided. Unfortunately, no documents remain to give an indication of the German thinking on these issues.

III. The German biological sabotage programme in the USA

Although the USA was neutral until 1917,²⁰ and there was substantial pro-German sentiment at the beginning of the war, the British blockade of German ports meant that US productivity was essentially at the service of the Allies. The Imperial German Government recognized very early that US productivity could be a critical factor in a prolonged conflict and endeavoured to reduce its effect by a systematic programme of sabotage. Most of the sabotage was aimed at interrupting the flow of munitions to the Allies by planting incendiary devices in munitions plants, stockpiles, trains and ships.

The German sabotage network matured in parallel with the scaling up of the US munitions industry, becoming fully operational by early 1915. Since it was difficult at the time for German nationals to travel from Europe to the United States except on diplomatic passports, the sabotage network was assembled largely from indigenous agents. This force was developed by utilizing German merchant seamen stranded in the USA by the outbreak of hostilities, patriotic German-Americans and Austrian-Americans, Irish nationalists and disaffected US workers. The sabotage operations were directed by the German diplomatic and consular corps, who also acted as couriers to carry instructions, *matériel* and cash from Germany to the USA. The programme was quite successful, destroying many tens of millions of dollars worth of munitions.²¹

¹⁸ Convention Respecting the Rights and Duties of Neutral Powers and Persons In Case of War on Land, The Hague, Oct. 18, 1907, entered into force Dec. 18, 1907; and Convention Concerning the Rights and Duties of Neutral Powers In Naval War, The Hague, Oct. 18, 1907; entered into force Dec. 18, 1907. See Friedman (note 9), pp. 324–31, 385–94.

¹⁹ Best, G., *Humanity in Warfare: The Modern History of the International Law of Armed Conflicts* (Weidenfeld and Nicholson: London, 1980), pp. 145–46, 172–79.

²⁰ The USA severed relations with Germany over the issue of unrestricted submarine warfare in early Feb. 1917 and expelled German diplomats; war was declared on 6 Apr.

²¹ The USA was ultimately awarded \$21 million plus interest (a total of \$55 m.) as compensation for the sabotage damage, but that amount was based on claims in only the 2 largest of the dozens (perhaps hundreds) of successful sabotage incidents: the explosion at the Black Tom munitions dump in New Jersey harbour and the fire at the artillery-shell assembly plant of the Canadian Car and Foundry Company in Kingsland, N.J.

In addition to munitions, the USA shipped horses and mules to France and the UK for use as cavalry and draft animals (horses and mules had considerable tactical importance on all fronts). These, too, became the target of German sabotage, planned in Berlin. The first attempt, early in 1915, was a failure, as described in testimony before the Senate Judiciary Committee by Inspector Thomas Tunney of the Neutrality and Bomb Squad of the New York Police Department (charged with investigating German sabotage violations of US neutrality).²² Bacterial cultures of *Pseudomonas mallei*, the causative agent of glanders, are alleged to have been smuggled into the USA by a man named Sternberg (first name not recorded), who travelled to the USA with Captain Franz Rintelen, bringing money to bankroll the nascent sabotage programme. Sternberg gave the cultures to Otto Wolpert, pier superintendent of the North German Lloyd steamship lines. Wolpert gave them in turn to an interned German, Herman Ebling, with instructions to ‘shove them up the nose of every third or fourth horse he would see on the stockades and along the ships or water fronts’. Ebling, however, claimed to have disliked the idea and to have tossed the cultures into the water.²³

The next attempt was more systematic and may have enjoyed more success. The central figure was Anton Dilger, a physician in his early thirties. He was born in 1884 in Front Royal, Virginia, of German parents. His father had been an artillery officer in Germany before emigrating to the USA and serving with distinction as a captain in the Union Army during the 1861–65 US Civil War. The family was well thought-of and lived on a farm a few miles outside Front Royal. Dilger is said to have spent most of his life in Germany, moving there when he was about nine years of age and living with relatives there until he was grown. He held a US passport continuously from at least 1908, renewing it at four-year intervals.

He went to gymnasium (secondary school) in Bernsheim and then trained as a physician at Heidelberg and Munich from 1903 to 1908. He later worked as an assistant in the Heidelberg University surgical clinic while doing research for a doctoral dissertation, attempting (unsuccessfully) to grow animal cells in tissue culture. He was awarded the doctoral degree *summa cum laude* in 1912.²⁴

There is nothing in Dilger’s records from Heidelberg that would indicate an unusual degree of interest in microbiology; no courses in the discipline are listed, and his specializations do not include microbiology. However, any physician of the time would have been capable of culturing and identifying micro-

²² United States Government, *Brewing and Liquor Interests and German and Bolshevik Propaganda: Report and Hearings of the Subcommittee on the Judiciary, United States Senate, Vol. 2* (US Government Printing Office: Washington, DC, 1919), p. 2676.

²³ Landau (note 1) has a much more florid account of the beginning of the programme. However, his sources are not specified, and Tunney’s account, based on first-hand investigation, is far more credible.

²⁴ Most US records (as well as secondary sources) mistakenly claim him to have been educated at Johns Hopkins. This misinformation stems from the testimony of several agents who worked with him. This may have been deliberate, as part of Dilger’s cover story when he returned to the USA to undertake sabotage work. In any event, by his own testimony he was trained at Heidelberg and not licensed to practice in the USA (NAS Record Group 165, Records of the WFGS, Military Intelligence Division Correspondence 1917–1941, Personal File 19368, 29 July 1917), and he was never a student at Johns Hopkins. He is not included in the Johns Hopkins *Half Century Directory*, which lists all students (medical, graduate and undergraduate) for the years 1876–1926, nor does he appear in the Correspondence File of the Dean of the Medical School, or in any of the Medical School Catalogs for the years 1900–12 or in undergraduate student records (1876–1945). His training at Heidelberg is verified in the university records. Universitätsarchiv, Ruprecht-Karls-Universität Heidelberg. Studentenakten und Promotionsakten H-III-862/14, folio 98-102; and H-III-162/18, folio 30–32.

organisms in his office/laboratory. Furthermore, Dilger's thesis undoubtedly required the use of standard microbial culture techniques, identical or very similar to those used later in the sabotage programme.

Dilger claimed to Paul Hilken (a German-American businessman who acted as paymaster for the German spy and sabotage network in the USA) to have volunteered as a surgeon in the Bulgarian Army in the 1912–13 Balkan War and to have been decorated.²⁵ In a 1917 interview with an agent of the US Bureau of Investigation (the forerunner of the Federal Bureau of Investigation, FBI), which had identified him as a possible German spy, he claimed that he had served with Major Fauntleroy and Major Ford of the US Medical Corps in the Balkans.²⁶ In any event, at the outbreak of World War I he appears to have been back in Germany, where he is said to have been placed in charge of a military hospital in Karlsruhe, with the rank of colonel in the Imperial German Army Medical Corps (although he claimed to US officials to have been in charge of hospitals for the German Red Cross).

He returned to the United States in April 1915. The ostensible purpose was recuperation from nervous stress occasioned by the horrors of treating children injured when France bombed a church. Almost certainly this was a cover story designed to generate sympathy for the German cause, and he was simply on assignment for the General Staff; Paul Hilken later testified:

Germany detailed Anton Dilger to Secret Service work and he came back to the United States with a supply of 'cultures', glanders and anthrax germs, with which horses and mules were to be inoculated. I remember that the first cultures which Anton Dilger brought had been bottled for some time and there was some doubt as to whether they were still alive. Dilger purchased a germ hatching oven and utilized this to breed new cultures.²⁷

Apparently the cultures were viable; Hilken refers to a visit he made on 7 May 1915 to the laboratory and mentions 'inoculation of guinea-pigs'.²⁸ Since the operation continued, it can be confidently presumed that the virulence testing was positive. Hilken's testimony is confirmed by that of Dilger's brother Carl, who said:²⁹

My brother, Anton Dilger, had been in Germany and I met him in Washington or Chevy Chase when I came there in [April] 1915. My brother had been doing some work for the German Government and he suggested that I help him with it. My brother was a doctor, and his part of the work had principally to do with making disease cultures for Germany to use in inoculating animals with disease, that were being pur-

²⁵ NAS Record Group 76, Records of the Mixed Claims Commission, Entry 11 (US Exhibits), Exhibit 829, 'Examination of Paul G. L. Hilken,' 26 Aug. 1930; and NAS Record Group 76, Entry 14 (Printed Copy of US Exhibits), Exhibit 583, 'Examination of Paul G. L. Hilken', Dec. 1928.

²⁶ NAS Record Group 165 (note 24).

²⁷ NAS Record Group 76 (note 25), Entry 14 (Printed Copy of US Exhibits), Box 5, vol. 9, 16 May 1930, p. 5771. Note that this implies that Dilger brought cultures into the country on more than 1 occasion. To the knowledge of the present author, this has not been confirmed.

²⁸ NAS Record Group 76 (note 25), Entry 29 (Records Relating to the Sabotage Claims Filed with the Commission), Box 3, 'Memorandum *re* record data *re* Carl Dilger with specific respect to the record as it existed at the time of the decision of October 16, 1930', 12 Nov. 1935, p. 4.

²⁹ NAS Record Group 76 (note 25), Entry 14 (Printed Copy of US Exhibits), Box 5, vol. 9, Exhibit 764, 18 Apr. 1930, pp. 5649–52.

chased in the United States for the Allied Governments. I worked on this business of propagating germs for several months after I reached Washington some time in 1915.³⁰

The culturing operation, occasionally termed ‘Tony’s Lab,’ was set up in the basement of a house in the Chevy Chase district of north-western Washington, DC, rented by Anton and Carl. In their home laboratory the Dilgers produced cultures of *Bacillus anthracis* and *Pseudomonas mallei*, the causative agents of anthrax and glanders.

The bacteria were apparently cultivated on solid media, then scraped off the surface and suspended in liquid. As summarized by Heinrich Kliewe (Surgeon General’s Office of the *Wehrmacht*), in a 1941 report: ‘The agents took the cultures with them into the enemy country, cultivated the glanders bacilli with Ragitagar-glycerine,³¹ which they had brought along, suspended the cultures and painted the nostrils of horses with the material’.³²

A few months after Dilger’s arrival in the USA in April 1915 and the establishment of a culture facility in the basement of his rented home, the biological sabotage programme became operational. The cultures were administered to horses and mules in holding pens at the docks in Baltimore, Newport News, New York and Norfolk. The agents were a group of stevedores recruited by Captain Fredrick Hinsch, master of the German steamship *Neckar*, trapped in the USA by the British blockade. Hinsch became the director of a group of agents sabotaging ships, wharves and warehouses with incendiary devices, and the same agents were used for distributing microbial cultures. The principal agent was J. Edward Felton, a 30-year-old Black man, who had been working as a foreman on the docks for the North German Lloyd Steamship Line in Baltimore (of which Hilken was part owner, and which owned the *Neckar*). Since the British blockade prevented German ships from crossing the Atlantic Ocean, North German Lloyd employees were short of work. Hinsch found many of these men eager for additional jobs. Late in 1914 or early in 1915, Hinsch approached Felton with a request that he distribute handbills among dock workers in Norfolk, fomenting labour unrest. Felton did this, until he was promoted to planting incendiary bombs on ships and wharves. By this time he had a group of Black stevedores working for him and, as they were intimately familiar with the waterfront and the routines of cargo handling, they were successful in gaining access, starting fires and avoiding capture. Hinsch was pleased. When Felton was later deposed in 1930, he stated:

My first work with these fire things for Capt. Hinsch commenced some time early in 1915. From then on for about a year or two I was receiving regularly things for use in

³⁰ Carl Dilger would have been well suited for the job, as he had extensive experience in the brewing industry.

³¹ Ragitagar referred to dried culture media produced by Merck. Geissler, E., Private communication with the author, 15 Feb. 1996.

³² Translation of German Folder of Official Directives and Correspondence on biological warfare. Kliewe, H., ‘Extract from publications of foreign authors concerning the supposed use on the part of Germany of bacteria as a weapon of war’, 28 July 1941, p. 14, NAW Record Group 165 (note 24), War Department General and Specific Staffs, ALSOS C-H/303. This is at the end of a summary of published accounts in the foreign press relevant to biological warfare. However, it appears that the quoted passage was based on sources not mentioned. E.g., Kliewe mentions use of biological weapons in the USA, not mentioned in any of the sources he reviews; the culturing details also are not mentioned in his cited sources. Another part of this passage is cited below.

starting fires. I also was receiving expenses and an allowance of money of about \$150 to \$200 a week, which I used in paying other men to distribute these fire things . . .

A few months after I commenced work on trying to start fires Capt. Hinsch explained to me that he had some still further work for me to do in connection with some germs to start disease among the horses that were being collected at different shipping points. That work commenced, as near as I can remember, about the late summer or early fall of 1915. From then on for a period of nearly a year I was working regularly under Capt. Hinsch in also distributing some disease germs. I did this work in Norfolk, Newport News and in New York City.

There was a place up in the northern part of New York City not far from Van Cortland Park—it may have been in the city limits of Yonkers—where horses were being collected for shipment to Europe. Capt. Hinsch sent me there and I went there several times in connection with this work. I also made a number of trips to Norfolk and Newport News for the same purpose.

The germs were given to me by Capt. Hinsch in glass bottles about an inch and a half or two inches long [*c.* 3.8–*c.* 5 cm], and three-quarters of an inch [*c.* 1.9 cm] in diameter, with a cork stopper. The bottles were usually contained in a round wooden box with a lid that screwed on the top. There was cotton in the top and bottom to protect the bottles from breaking. A piece of steel in the form of a needle with a sharp point was stuck in the under side of the cork, and the steel needle extended down in the liquid where the germs were. We used rubber gloves and would put the germs in the horses by pulling out the stoppers and jabbing the horses with the sharp point of the needle that had been down among the germs.

We did a good bit of the work by walking along the fences that enclosed the horses and jabbing them when they would come up along the fence or lean over where we could get at them. We also spread the germs sometimes on their food and in the water that they were drinking.

Capt. Hinsch gave me the instructions as to where I would find the horses and also gave me the bottles of germs and the money. I used a good many of the same men on this work that I did on starting the fires. I had about ten or twelve men working on these matters for me. We would work at it sometimes at night and sometimes in the daytime. A good many of the men were also doing other work and they made this extra money on the side.

Capt. Hinsch was accustomed to giving me brown paper packages filled with these tubes and with the fire things. Sometimes he would give me these at his apartment in Baltimore and sometimes he would meet me at New York, Norfolk, or Newport News.

Capt. Hinsch spoke often when I met him of different fires that had occurred and of outbreaks of disease among horses and would make remarks about how well things were going.³³

Three of the men employed by Felton were also deposed, and they corroborated his story in detail. One of them, George Turner, added that sabotage operations had been conducted in Baltimore as well as in the cities mentioned by Felton.³⁴

It is thus clear that there was a systematic biological sabotage programme aimed at Allied remounts shipped from the Eastern seaboard of the USA, beginning in the summer of 1915 and lasting probably until autumn 1916. Anthrax and glanders bacilli were cultured, suspended in liquid and packaged into tubes in the Dilgers' basement laboratory, then distributed by Captain Hinsch to agents. This is established beyond any reasonable doubt by first-person testi-

³³ NAS Record Group 76 (note 25), Box 8, Exhibit 761, 11 Apr. 1930.

³⁴ NAS Record Group 76 (note 25), Box 8, Exhibit 772, 12 June 1930.

mony from a number of participants, whose accounts have a high degree of consistency.

Precisely when the programme ended is unclear. Felton's testimony would suggest that it lasted into the autumn of 1916, and this is consistent with the testimony of Carl Dilger. Anton Dilger returned to Germany in January 1916, apparently leaving bacterial culture production in Carl's hands. Hilken and Hinsch distrusted Carl (who was apparently only allowed to participate in the programme at his brother's insistence). After a few months, apparently after a row about money, they sent him to Germany in early July with a sealed envelope addressed to the General Staff. Carl was told it contained important papers; it actually contained a request that Carl be kept in Germany for the duration of the war. However, Carl became nervous about being found in possession of secret correspondence if he were intercepted by the UK, and he tossed the envelope overboard. He returned six weeks later, to the great surprise of Hilken and Hinsch. He indicated that both the biological and incendiary sabotage ceased shortly thereafter.³⁵

Anton remained in Germany for another year (by which time the USA was at war with Germany). The reason for his return in July 1917 is uncertain. Perhaps he intended to restart the biological sabotage programme now that the USA was a belligerent and most German agents had fled to Mexico;³⁶ as a US citizen he may have expected to be able to act freely. However, it must have become rapidly clear to him that he was under suspicion (he was interviewed shortly after his return by an agent of the Bureau of Investigation), and he, too, left for Mexico later in the month, never to return. There he became Chief of the Mexico Station of Department IIIB, reporting directly to the General Staff.³⁷ Later he was transferred to Madrid.

Dilger appears to have had hopes of re-establishing a biological sabotage operation in North America, as evidenced by telegrams between Madrid and Berlin in which Delmar (his principal alias after his departure from the USA in 1917) is said to have been eager to have cultures shipped to Mexico City.³⁸ Unable to travel himself (he is thought to have been ill), he requested permission to send an agent (Gehrmann) ahead with cultures. Dilger finally returned to Mexico City in March 1918; whether Gehrmann preceded him with cultures is not known. Nothing further on biological sabotage is available in the records, and Dilger returned to Spain in August. There is no indication that he had re-established a biological sabotage programme in North America, or even tried.

He apparently died (under the name Alberto Donde, a known alias)³⁹ shortly thereafter in Madrid, on 17 October 1918, a victim of the influenza pandemic then sweeping the world. Acting on instructions from the Department of State, the US naval attaché in Madrid made an effort to positively identify Donde as Dilger, but he could only obtain testimony that the man who had died strongly

³⁵ NAS Record Group 76 (note 25), Entry 29 (Records relating to the sabotage claims filed with the commission), Box 3, 'Memorandum Re: record data Re: Carl Dilger with specific respect to the record as it existed at the time of the decision of October 16, 1930', 12 Nov. 1935.

³⁶ If so, he may have been carrying new cultures; this would explain Hilken's implication that he had transported cultures on more than one occasion (see note 27).

³⁷ O'Toole, G. J. A., *Honorable Treachery: A History of U.S. Intelligence, Espionage, and Covert Action from the American Revolution to the CIA* (Atlantic Monthly Press: New York, 1991), p. 264.

³⁸ NAS Record Group 76 (note 25), Box 3, Exhibit 320, 18 Jan., 20 Jan. and 22 Jan. 1918.

³⁹ NACP Record Group 59, General Records of the Department of State, Decimal file 862.20212/1647, letter from the French Ambassador to the Secretary of State, 16 Nov. 1918.

resembled Dilger (whose passport photograph was shown to hospital workers and others who had last seen Donde). Since Donde had a moustache (Dilger had been clean-shaven in his passport photograph), it is not surprising that casual acquaintances could not give a definitive identification, especially since the investigation was conducted several months after his death.

He was buried in the civil cemetery in Madrid. The German Government retained his effects, maintaining that Donde was a German citizen and indicating their intent to send the effects to his family. Presumably they included the Iron Cross Second Class, awarded in January 1918.⁴⁰ Carl Dilger testified that after the war he received about \$2000 from the German Government, said to be money that Anton Dilger had at his death.⁴¹

It is clear that the 1915–16 biological sabotage programme in the USA was the responsibility of the Political Section of Deputy Department IIIB. There is a documentary record of consultation between US operatives and the Director, Captain Rudolph Nadolny (section IV of this chapter documents how Nadolny was simultaneously administering biological sabotage operations in Romania). Paul Hilken, Carl Dilger and Fred Herrmann (another of Germany's secret agents in the USA) all testified independently that in 1916 they met on several occasions in Berlin with Nadolny and Captain Hans Marguerre, probably Major Marguerre, a senior consultant to Department IIIB of the General Staff.⁴² Anton Dilger was present at one of these meetings. The discussions with Nadolny and Marguerre concerned the US sabotage programme, and the German officers equipped Carl Dilger with a trunk with a false bottom in which he transported incendiary devices back to the USA. Presumably, the biological sabotage programme was discussed as well, especially with the Dilger brothers. Hilken and Herrmann were involved in incendiary sabotage as well as biological sabotage, but both Dilger brothers are only known to have been involved in the biological programme prior to their meeting with Nadolny and Marguerre.

The effectiveness of the programme is difficult to assess. The German agents and diplomatic corps certainly believed that it was effective and mentioned epidemics of disease among the animal shipments. However, the present author has not been able to confirm such effects. Certainly the methods described could lead to infection; anthrax spores jabbed into the bloodstream could be infectious (septicaemia is common in anthrax); and glanders also normally disseminates via the bloodstream. Contaminated food and water could also be an effective means of initiating infections, as the level of contamination could certainly exceed that known to cause natural transmission in herd animals. Once started, epidemics among the confined and stressed herds could have had quite high mortality.

⁴⁰ NAS Record Group 76 (note 25), Entry 24 (US Exhibits), Box 10, 'Chronology of German Acts; Annex to American brief for Washington argument of November, 1932', p. 64

⁴¹ NAS Record Group 76 (note 25), Entry 29 (Records Relating to the Sabotage Claims Filed with the Commission), Box 2, 'Memorandum Re: whereabouts of Anton Dilger as indicated in the record', 15 Sep. 1932, p. 8.

⁴² Gneist, C., Eidesstattliche Aussage vor dem Amtsgericht Berlin-Mitte in der Klagesache der Lehigh Valley Railroad Company und der Agency of Canadian Car & Foundry Co., Ltd. gegen die Deutsche Regierung [Sworn statement before the Berlin-Mitte District Court in the Proceedings of the Lehigh Valley Railroad Company and the Agency of Canadian Car & Foundry Co., Ltd against the German Government], PAAA R 95279, 18 July 1929, pp. 1–4.

Garrett claims that General Frederick Maude's advance on Baghdad in 1917 was delayed by glanders resulting from the biological sabotage programme.⁴³ It is certainly credible that there would have been disease among horses and mules, since a critical shortage of *matériel*, including animals, earlier in the Mesopotamian campaign had been redressed by large shipments to Basra during 1916, when the biological sabotage programme in the USA was in full operation. Probably a significant portion of the animals purchased by Britain in the USA had a Middle Eastern destination, and chronically infected horses could have brought disease to the region. However, the importance of animal disease, even if it occurred and was ascribable to the biological sabotage programme, is not clear. Maude's four-day pause in Azizieh during his advance up the Tigris to Baghdad in the spring of 1917 was apparently simply to allow his logistic support to catch up with his rapidly moving cavalry and infantry.⁴⁴

Furthermore, the lack of mention of human casualties is odd. Accidental needle sticks are a common occupational hazard of anyone who works with needles, and Felton's gang of untrained saboteurs, working hurriedly and covertly, sometimes at night, would have been at very high risk for such accidents. Rubber gloves provide scant protection. The absence of reports by any of the numerous participants of human illness associated with the operation suggests that the cultures may have been non-viable or avirulent. Depending on the care taken in culturing them, and on periodic verification of their identity, it is even possible that contaminants had taken over Dilger's cultures and he was inadvertently growing non-pathogenic organisms (it is not known if he did periodic virulence tests on animals). Certainly any disease in the herds could have been a simple consequence of crowding together large numbers of animals of diverse geographic origin. It is thus probably impossible at this point to determine if the biological sabotage programme had any success at all.

IV. The German biological sabotage programme in Romania

Romania was neutral until August 1916, while negotiating with both the Allies and the Central Powers seeking territorial concessions.⁴⁵ It was strategically placed among the Austro-Hungarian Dual Monarchy, Bulgaria and Turkey (all allied with Germany), Serbia (occupied by the Central Powers) and Russia (allied with France and Britain). An active trade in oil, grain and sheep was maintained with all sides.

Germany appears to have begun biological sabotage operations in Romania as early as June 1915, only slightly after those in the USA. In May, Nadolny wrote to the military attaché in Bucharest: 'Preparation for acts of sabotage against railways, military facilities, especially ammunition factories and, in addition, infection of military horses, etc. is desirable in case Romania declares war against us. Explosives and cultures of glanders can be provided by us. Cable, please, which actions are advisable, whether preparation is possible, and where

⁴³ Garrett, B. C., 'Tony's Lab: clandestine German biological warfare in the USA', *ASA Newsletter*, no. 37 (1993), pp. 1, 10–11.

⁴⁴ *The Times History of the War*, vol. 13 (The Times: London, 1917), p. 280.

⁴⁵ Torrey, G., 'Rumania declares war', ed. P. Young, *The Marshall Cavendish Illustrated Encyclopedia of World War I* (Marshall Cavendish: New York, 1984), pp. 1591–95.

and when to ship materials'.⁴⁶ Envoy Hilmer von dem Bussche⁴⁷ responded that there were several appropriate targets and that 'We could immediately attempt to infect horses. Precise instructions on how to use cultures of glanders are necessary'.⁴⁸

Apparently this suggestion was adopted. Consistent with previous policy, Nadolny emphasized that biological agents were to be used only against animals, not humans: 'The use of pathogens against humans is not desired; use only against Army horses and livestock'.⁴⁹ Bussche replied on 10 June 1915: 'Berg⁵⁰ has received the anthrax and glanders cultures. If necessary we will request additional supplies of agent'.⁵¹

More cultures were requested by Berg in September—implying that the cultures delivered in June had been used.⁵² Shipment on 7 September was confirmed by a telegram from Hans Steinwachs to Berg in Bucharest: 'Consignment of glanders cultures will leave tomorrow, under guard, by diplomatic courier. This time it should be sufficient to pour each vial into a water pail'.⁵³

Approximately one year later the rest of Nadolny's programme of sabotage began to be implemented. Explosives, and at least one more shipment of microbes, were taken through diplomatic channels to the German consulate in Bucharest and stored there. However, before they could be used, Romania, having negotiated an immensely favourable agreement with the Allies, declared war on Austria–Hungary on 27 August 1916. This immediately triggered a German declaration of war on Romania on 28 August 1916.

With the departure of the Central Powers' diplomats from Bucharest, the USA, still neutral, assumed responsibility for German interests in Romania and for property left by the departing diplomats. At the request of the German Minister, a number of cabinets and boxes within the legation were sealed.

Although the shipments of *matériel* for the sabotage programme had been through diplomatic channels and were immune from search, they had nevertheless attracted the attention of the Romanian Government, which had placed the German diplomatic and consular officials under surveillance. In the official account of the incident, Romanian Foreign Minister Porumbaru wrote:

⁴⁶ Nadolny, Stellv. Generalstab der Armee, Abt IIIb, Sektion Politik, to the Auswärtiges Amt, Berlin, PAAA R 21200, 17 May 1915, p. 58 (author's translation). This and other documents are reprinted in Geissler (note 2).

⁴⁷ Hilmar von dem Bussche-Haddenhausen became German envoy in Bucharest in 1914.

⁴⁸ Bussche, Telegramm, Der K. Gesandte an Auswärtiges Amt. Dem Gen. St. mitgeteilt [Telegram, The imperial envoy to the Foreign Ministry. The General Staff has been informed], PAAA 21200, 21 May 1915, p. 60 (author's translation).

⁴⁹ Nadolny, 'Telegr. an Militärattaché der Kaiserl. Gesandtschaft in Bukarest' [Telegram to the military attaché at the imperial embassy in Bucharest], PAAA R 21200, 6 June 1915, p. 108 (author's translation).

⁵⁰ German Naval Attaché in Bucharest; first name unknown.

⁵¹ Bussche, 'Telegramm der K. Gesandte an Auswärtiges Amt. Bukarest. Dem Gen. Stab (Hptm. Nadolny) mitgeteilt' [Telegram from the imperial envoy to the Foreign Ministry, Bucharest. The General Staff has been informed], PAAA 21200, 10 June 1915, p. 108 (author's translation).

⁵² Berg, 'Telegramm—durch Tjaben—des K. Konsul an Auswärtiges Amt für Reichskolonialamt Direktor Steinwachs' [Telegram—through Tjaben—from the imperial consul to the Foreign Ministry for Director Steinwachs of the Colonial Office], PAAA 21200, 2 Sep. 1915, p. 158. Dr Hans Tjaben was Consul in Bucharest from 1911 to 1916. Steinwachs was a member of the ordnance department of the Political Section of the General Staff charged, among other things, with delivering *matériel* to sabotage operations in the Balkans. The Colonial Office appears to have functioned merely as a mail drop for the ordnance department. Geissler, E., Private communication with the author, 13 May 1996.

⁵³ Steinwachs, Telegramm an Berg, Bukarest [Telegram to Berg, Bucharest], PAAA 21200, 6 Sep. 1915, p. 163 (author's translation).

The attention of the Royal Government had for some time past been attracted [*sic*] by certain doings of the German Consulate at Bucharest which seemed suspicious. Repeatedly parcels and boxes had been brought, with display of great precaution into the building of the German Consulate which had not been taken out again until the evening before our declaration of war (14/27 AUGUST⁵⁴) when a certain number of them were transported to the German Legation, which at Bucharest occupies another building, situated at quite a distance from the Consulate mentioned further above. The Royal authorities being convinced that the boxes in question had not been taken away by the members of the Diplomatic Mission of Germany on their departure, and that accordingly they still were in the building of the Legation the Government ordered the Prefect of Police of Bucharest to take the necessary steps in order to find those boxes and to examine thier [*sic*] contents.—Accordingly the Prefect of Police communicated with the Minister of the United States of America, who is in charge of the interests of German subjects in Roumania, as well as of the German Legation Premises. His Excellency very kindly authorized Mr. W. Andrews, Secretary of the Legation to proceed, together with the Prefect to the necessary researches.⁵⁵

The last is a diplomatic fiction. US ambassador Charles Vopicka protested the search. William Andrews, Secretary of the US Legation, was sent with the Prefect of Police as an observer of the unauthorized search, not as a co-investigator, and he later refused (on State Department instructions) to cosign the deposition describing the search and its findings.⁵⁶ However, the grounds of the legation had not been sealed, and the German caretaker agreed to the search. Minister Porumbaru continued:

On the day of 22 September old st./5 Oct. n. st. Mr. Andrews and the Prefect of Police having gone to the German Legation, found there the so-named Michael Markus, caretaker of the premises, and Andrei Maftai, servant, both of them authorized to inhabit the Legation building; upon being interrogated they made no difficulty whatever, but admitted that the same day of, or the day before the general mobilization of the Royal Army, which was published at the same time as our declaration of war to Austria, the Attaché of Legation, Lucian Adolph, had given Markus a parcel wrapped up in white paper and sealed with theseal [*sic*] of the German Consulate at Kronstadt (Brasso),⁵⁷ giving him the order to bury this parcel in the garden of the Legation; and as Markus, not having time enough, could not finish the burying of the parcel, Adolph finally finished burying the parcel by himself. This same man, Markus, admitted also that the boxes transmitted from the German Consulate to the Legation had remained there in one of the rooms in the basement until the day before the departure of the members of the Diplomatic Mission, when the Counsellor to the Legation, Werner von Rheinbaben, ordered Markus to bury them also in the garden. As this order could not be carried out immediately, Markus and Maftai proceeded later on, after the departure of the Diplomatic Mission, to bury these cases under the direction of Mr. Rudolph Krüger, chancellor of the Legation, now attached to the American Legation, who advised the two men to handle the cases with all precautions. Marcus and Maftai declared to have no knowledge of the contents of the boxes nor of the parcel in question.

⁵⁴ The two numbers refer to old (Julian) and new (Gregorian) calendars, respectively; modern readers use the new calendar.

⁵⁵ NAW Record Group 59, General Records of the Department of State, decimal file 702.6271/16. The original was in French, with some of the attachments in Romanian; the English translations were prepared at the US legation in Bucharest before the documents were sent to Washington.

⁵⁶ NAW Record Group 59 (note 55), decimal files 701.6271/9, 10, 13, and 15.

The search went ahead and a number of chests were unearthed from the garden. These contained largely explosive charges and fuses. Despite the cooperation of the caretakers, it is probable that not all sabotage material was discovered. In transmitting the Romanian Government report of the incident to the US Secretary of State in February 1917, Andrews, then acting chargé d'affaires in Bucharest, wrote:

the former confidential agent of the German Minister, Dr. Bernhardt, who had been left with the Legation at the German Minister's request to assist in the care of German interests, admitted his knowledge of the explosives placed in the garden; told me that more was in the garden than had been found; that a still larger quantity had been buried in the house of the Legation; and that still worse things than this box of microbes [see below] were contained in the Legation . . .⁵⁸

What these 'still worse things' were is hard to imagine; the parcel from Kronstadt was serious enough: it contained microbial cultures, rather than explosives. In his deposition, Chief of Police Corbesco reported:

In another place of the garden, along the wall, which separates the Legation Garden of the neighboring house in the Cozma Street, under large pieces of fire-wood, which Mr. Marcus displaced, another search brought to light a box of rectangular form, wrapped up in white paper and bearing the seal of the Imperial German Consulate at Kronstadt (Hungary) in red sealing wax, as well as the following inscriptions:⁵⁹

Via courier! Top secret! Handle with care!!!

Bucharest

For the esteemed Mr. Kostoff.

To Colonel and Military Attaché at the Imperial Bulgarian Legation at Bucharest,
Mr. Samargieff

Under this first envelope there was another envelope of white paper and written on it in red pencil:

Top secret! By courier!

To the esteemed Royal Colonel and Military Attaché

Herrn von XXXXXXX

Although the name had been erased, several letters could be faintly recognized: Ham—t—in. This was certainly Colonel von Hammerstein, the German military attaché in Bucharest.

These instructions are interpreted, quite plausibly, by the French journalist Robert de Flers (who was in Bucharest at the time, knew the people involved and covered the story) in the following way:⁶⁰ The box was originally delivered

⁵⁷ Now Brasov, in Romania; at the time part of Hungary. Regaining Transylvania, in which Brasov lies and which contained a large proportion of native Romanians, was a major strategic goal of Romania in the war.

⁵⁸ NAW Record Group 59 (note 55).

⁵⁹ The original English translations of these two inscriptions are clumsy at best. The translations given here are those of the author, based on the original German as recorded in the Romanian report ('Durch Feldjäger! Ganz Geheim! Nicht werfen!!! Bucarest. Für Herrn Kostoff. S. Hochwohlgeb. Dem Oberst u Militärattaché an der Kaiserl-Bulgarischen Gesandtschaft zu Bucharest, Herrn Samargieff' and 'Ganz Geheim. Durch Tela. An den Königlichen Oberst und Militärattaché Herrn von . . . Hochwohlgeboren'). NAW Record Group 59 (note 55), Annex 1 to the French version of the report of Minister Porumbaru.

⁶⁰ de Flers. R., *Sur les chemins de la guerre* [On the paths of war] (Pierre Lafitte: Paris, 1919), pp. 129–38.

to von Hammerstein, who then prepared to send it via Constantine Kostoff, a Bulgarian agent,⁶¹ to the Bulgarian military attaché Colonel Samargieff. The outbreak of war presumably prevented this latter transfer. The intended transfer of the cultures to the Bulgarian Legation suggests that the biological sabotage was carried out by their agents; they certainly would have had a more extensive network of secret agents in Romania, given the shared border and recent tensions.

Corbesco continued:

In the inside of this box above a layer of cotton wool a typewritten note was found in German language reading as follows:

Enclosed find 4 small bottles for horses and 4 for horned animals.⁶² Use as previously discussed. Each tube is sufficient for 200 head. If possible administer directly into the animals' mouths, otherwise into their fodder. We ask for a brief report of any success that you have there, and if detailed results are obtained, we request the presence for one day of Mr K.⁶³

Under this layer of cotton-wool there were in all six little wooden white cases vizaed [*sic*] and sealed by us as originals.⁶⁴ In each of these there was a glass phial, containing a yellowish liquid, the composition of which remains to be proved exactly by way of an analysis.⁶⁵

The contents were analysed at the Institute of Pathology and Bacteriology of Bucharest and determined to be the agents of anthrax and glanders (in separate tubes).⁶⁶ They were viable and virulent, as determined by testing in guinea pigs and horses, respectively.

The programme in Romania was, like the simultaneous one in the USA, a sabotage effort against a neutral country supplying animals to the Allied Powers. The major difference is that Romania, being accessible by surface transport through friendly territory, permitted the cultures to be grown in Germany and shipped through secure channels to Romania. At least three shipments are documented, two of them probably actually used for sabotage and the third recovered by Romanian authorities from the garden of the German Legation. The effect, if any, of the use is not mentioned anywhere.

⁶¹ Kostoff, C. (Delegate of the Bulgarian railway administration to the Romanian railway directorate) *Microbe-Culture at Bukarest: Discoveries at the German Legation, from Romanian Official Documents* (Hodder & Stoughton: London, 1917), part 16, p. 15; and PAAA 21200, 13 June 1917, p. 149.

⁶² Presumably cattle, but perhaps sheep as well. Jones says that the British Admiralty intercepted a telegram giving permission for the deliberate infection of Romanian sheep destined for Russia; he does not give the date or any other details. Jones, R. V., *Reflections on Intelligence* (Heinemann: London, 1989), p. 181.

⁶³ It is not clear whether the report was to be made in person to Colonel von Hammerstein in Bucharest, or to Nadolny in Berlin.

⁶⁴ In other words, each of the cases had a police seal placed on it to guard its integrity prior to laboratory testing. The number of vials is confused; the German given by de Flers says 5 (1 for horses, 4 for horned animals); the Romanian transcript of the note says 8 (4 for horses, 4 for horned animals); and the Romanian police report says 6 were actually discovered. US Ambassador Vopicka reported (presumably based on Andrews' eyewitness report) that there were 6 vials of glanders culture and 2 of anthrax. NAW Record Group 59 (note 55), decimal file 701.6271/15. Possibly typographical errors were made in 1 or more of the accounts or translations; certainly numerals can be easily confused in handwritten form.

⁶⁵ Author's translation, from the German given in the Romanian report ('Anbei 4 Fläschchen für Pferde und 4 für Hornvieh. Verwendung wie besprochen. Jedes Röhrchen genügt für 200 Stück. Wenn möglich den Tieren direct in das Maul sonst in Futter. Bitten um kleinen Bericht über dortige Erfolge und falls Resultate zu verzeichnen wäre Anwesenheit von Hr. K. für einen Tag hier erwünscht'). NAW Record Group 59 (note 55), Annex 1 to the French version of the report of Minister Porumbaru.

⁶⁶ NAW Record Group 59 (note 55), Enclosures 7 and 8.

If the cultures were in fact used as intended, the agents distributing them covertly among Romanian animals were most likely Bulgarian. If the August shipments had not been interrupted before their transfer to Bulgaria, it is probable that the programme would have continued during the brief war (Romania was overrun by the Central Powers in January 1917).

V. The German biological sabotage programme in Spain

It is probable that Germany also mounted a programme of biological attack in neutral Spain, targeting horses and possibly cattle as well. Geissler has discovered telegrams exchanged between Berlin and Madrid that strongly indicate such a programme, in the context of a broader programme of sabotage in Spain, Portugal and the French Pyrenees, operated out of the German embassy in Madrid.⁶⁷ On 13 October 1915, Nadolny telegraphed the military attaché in Madrid that ‘Shipments of agents are discontinued until further notice, because the export of horses to France has ceased’.⁶⁸ Of course, this implies prior shipments, suggesting that biological sabotage may have begun earlier. There followed, from December 1915 through the first part of 1916, a correspondence involving Berlin, Madrid and Zurich (through which the shipments passed), focusing on the failure of shipments to arrive and on various ways of concealing them (this correspondence makes it clear that the agents of anthrax and glanders were both involved).

The transport from Switzerland to Spain via France was apparently risky: at least one shipment is known to have been intercepted, and Nadolny instructed Madrid that ‘If searched say that this is medicine for horses (dead bacteria)’.⁶⁹ Ultimately, in June, a German secret agent code-named Arnold (Dr Herman Wuppermann from the Political Section of Department IIIB of the General Staff) was sent to Madrid to ‘organize the production of E and B’.⁷⁰ It is not clear what ‘organize’ meant: probably to establish a facility to propagate cultures that Arnold would have carried with him from Berlin to Madrid. Ambassador Prince Ratibor wired Berlin shortly after Arnold’s arrival that the cultures were fine; whether this referred to cultures Arnold brought with him, or ones he produced in Spain, is not clear. These documents establish attempts to import and produce microbial cultures; however, it is unclear if any shipments or culture attempts were successful and, if so, whether and how the agents were used.

It is not clear when the programme in Spain ended. The fact that agent was still apparently being smuggled into Spain by U-boat from Croatia in 1918 (see section VII) suggests that sabotage in Spain may have continued until fairly late in the war.

⁶⁷ Geissler (note 2).

⁶⁸ Author’s translation; see Geissler (note 2) for details.

⁶⁹ Author’s translation; see Geissler (note 2) for details.

⁷⁰ Author’s translation. E and B were code names for the agents of glanders and anthrax, from their host genera *Equus* and *Bos*, respectively. See Geissler (note 2) for details.

VI. The German biological sabotage programme in Norway

Jones mentions a German telegram approving a 1916 effort to infect reindeer in Norway with anthrax (reindeer were used as draft animals for overland winter transport of British arms to their Russian allies).⁷¹ Beesly says that glanders cultures were shipped for this purpose to Oslo in diplomatic pouches, but that Norway, tipped off by the UK, violated diplomatic privilege and seized the shipment.⁷²

It is not clear if this reputed seizure of biological sabotage agents is confused, or if there were actually two captures of biological sabotage materials. Norwegian police records describe the January 1917 arrest of Baron Otto Karl Robert von Rosen and a number of companions in the far northern portion of Norway near the border with Russia (now Finland).⁷³ None of the men held passports, and their effects contained high explosives, said by the Baron to be for Finnish nationalists, and by his companions to be used to destroy Russian communications and transport lines for Germany. Earlier sabotage expeditions were claimed.

After the baron and his party were deported to Sweden, 19 sugar cubes, each with an embedded capillary tube were discovered in his confiscated effects. The capillaries apparently contained the anthrax agent, and they were presumably intended to be fed to horses and reindeer. One of these sugar cubes was recently recovered from Norwegian police archives, and *Bacillus anthracis* detected in its contents by culture and by polymerase chain reaction (PCR) amplification of unique sequences.

Presumably the sabotage efforts in Norway ceased after this; they would thus have been quite short-lived, probably confined to late 1916.

It is notable that this is the first recorded example of this new method of agent contained in capillaries embedded in sugar cubes, replacing the injection used in the USA and the direct feeding of liquid culture used in Romania. Presumably, this new method was developed and tested in Germany; it is tempting to consider Dilger as a prime candidate for the responsible agent during his year and one-half in Berlin after leaving the USA (January 1916–July 1917). He had the necessary medical and microbiological training, and he had field experience in biological sabotage from the US operations.

VII. The German biological sabotage programme in South America

There was also an active programme of biological sabotage in Argentina, revealed by a series of intercepted and decoded German wireless telegraph transmissions. Under Admiral Reginald Hall, British Naval Staff Intelligence intercepted and decoded over 20 000 transmissions to and from the German General Staff, using a series of captured code books and a staff of skilled crypt-

⁷¹ Jones (note 62), p. 181.

⁷² Beesly (note 13), p. 201.

⁷³ Redmond, C. *et al.*, 'Deadly relic of the Great War.' *Nature*, vol. 393 (1998), pp. 747–48.

analysts.⁷⁴ Of these 20 000 transmissions, some 40 dealt with biological sabotage.⁷⁵

The programme in Argentina was carried out by an agent code-named Arnold (Wuppermann from the Political Section of the General Staff, discussed above in section V). He travelled to Spain in June 1916 to organize microbe production there, then went on to Argentina in July.⁷⁶ In Argentina he apparently became the Buenos Aires agent for the North German Lloyd Lines (Hilken's Argentinian equivalent).⁷⁷

Arnold visited Hilken in the USA in early 1917, leaving hastily when the USA severed relations with Germany. The purpose of the visit seems to have been to obtain money for sabotage in Argentina and technical information about incendiary sabotage. He left with \$1000 in gold (a further \$5000 were sent in May).⁷⁸ Biological sabotage was under way at least by the summer (possibly much earlier, see below). Arnold claimed in a letter to Madrid in July 1917 that 'the results from this department ['E' and 'B'] appear to be very satisfactory'.⁷⁹ This of course suggests that as early as July 1917, and possibly considerably before, Arnold was equipped with cultures and actively inoculating animals.

A British Admiralty Memorandum from the Naval Staff Intelligence Division, summarizing a series of intercepted and decoded German telegrams between the General Staff in Berlin and the military attaché in Madrid (who relayed communications between Berlin and Buenos Aires), gives the following account:

In autumn, 1917, the [German] Military Attache in Madrid apparently sent to Berlin a report of sabotage plans [almost certainly operations rather than plans—Arnold had been in Buenos Aires for a year by then] in Argentina. Berlin replied on 12th of September that further instructions would be given concerning bottles (cultures).

Madrid had meanwhile sent some cultures to Arnold at Buenos Aires by a female agent but, as she had fallen under suspicion en route, Arnold was instructed to suspend operations for the present. In reporting this to Berlin on 7th February [1918] it was stated that past operations had hitherto been very successful and relatively free from risk.

Berlin replied on the 10th February instructing Arnold to continue his successful work against cattle. Quoting this in reply Arnold reported on the 14th February, that owing to his work the export of horses to France and Italy had for the time being completely ceased. Since September four ships, with 5400 miles [*sic*, read 'mules'] started for Mesopotamia: all were thoroughly treated.⁸⁰

⁷⁴ Beesly (note 13); and Hall and Peaslee (note 3).

⁷⁵ Hall and Peaslee (note 3), p. 85.

⁷⁶ Geissler (note 2); and Geissler, E., *Biologische Waffen—nicht in Hitlers Arsenalen. Biologische und Toxin-Kampfmittel in Deutschland von 1915 bis 1945* [Biological weapons—not in Hitler's arsenals. Biological and toxin weapons in Germany from 1915 to 1945], (LIT-Verlag: Münster, 1998).

⁷⁷ Office of Naval Intelligence memo, 'Maritime Activities in the Argentine', 5 Apr. 1919, NAW Record Group 165, Records of the WFGS, Military Intelligence Division Correspondence 1917–1941, File 10987–506.

⁷⁸ NAS Record Group 76 (note 25), Box 3, Exhibit 320, July 1917, no. 145

⁷⁹ Note 78.

⁸⁰ NAS Record Group 76 (note 25), Box 3, Exhibit 320, 23 Feb. 1918. The original telegrams are found in the same file. The Office of Naval Intelligence here interprets 'cattle' as a code word for horses and mules; alternatively, the programme may have targeted both cattle (as food animals shipped to the Allies) and horses and mules (remounts). However, there is no mention of cattle in other documents.

The culture shipment mentioned was apparently in the form of ampoules embedded within sugar cubes, as in the Norwegian programme. Beesly says the cultures were carried by U-boat from the Austrian port of Pola on the Adriatic Sea (now Pula, Croatia), to Cartagena, Spain, where they were transferred to the German diplomatic corps, which arranged for their transport to Buenos Aires by commercial steamship. One such shipment, in early 1918 (the one referred to in the wireless traffic summarized above), was concealed in a false lid of a trunk in the custody of Marthe Regnier, mistress of German naval attaché Korvettenkapitän Krohn.⁸¹ Although her mission was known to the British, their attempt to intercept her steamship was frustrated by fog, and the shipment got through.

Beesly's account makes it clear that these sugar cubes were used directly for sabotage, rather than being used as inoculum for a culturing programme as in the USA. Ampoules within sugar cubes could certainly be an effective means of orally infecting horses or mules. If the account is true, there must have been multiple shipments. It is noteworthy that U-35⁸² visited Cartagena on several occasions: June and November 1916, and February 1918. The last of these visits was met by the Cartagena police, who had been tipped off by the UK; 12 cases of doctored sugar cubes were confiscated. This fiasco appears to have led to the recall of Krohn, who, since he could not bring his mistress to Germany (she was French), persuaded her to go to Buenos Aires for him. The sugar cubes she carried on that occasion must have been from stores accumulated from an earlier shipment, since the recently arrived shipment had been confiscated (unless part of the latter escaped detection).

It is suggestive that the first visit by U-35 to Cartagena was in June 1916, exactly when Wuppermann (Arnold) was sent to Spain (see section V). Gray has claimed that cultures were shipped on this trip: 'the true purpose of U-35's visit to Cartagena was to deliver two phials of anthrax and glanders germ cultures for use by German agents in Spain'.⁸³ It is likely that Arnold himself brought the cultures to Spain by U-boat.⁸⁴ Whether he carried cultures on to Argentina is unclear; if so, the biological sabotage programme in South America probably began in the late summer of 1916. If not, it would have begun sometime during 1917.

A programme of sabotage of grain shipments had apparently been initiated even earlier, in early 1915. The indications are that it utilized chemical agents rather than microbial ones (although fungal or bacterial spoilage agents cannot be ruled out). A telegram from Berlin to Buenos Aires, signed 'Zimmerman', mentioned the use of capsules of mercaptans, which would rupture when the grain was milled, thus spoiling the flour.⁸⁵ This work was suspended in February 1918, as 'it promises little success'.⁸⁶ A programme targeting grain shipments from Spain is also mentioned in German telegrams in 1915–16;⁸⁷ but it is not clear whether it ever became operational or what the results were.

⁸¹ Beesly (note 13), pp. 201–202.

⁸² One of the German Adriatic fleet of U-boats based at the Austrian–Hungarian port Cattaro, now Kotor, Montenegro.

⁸³ Gray, E., *Submarine Warriors* (Bantam Books: New York, 1988), pp. 96–97. Unfortunately, Gray does not specify his sources.

⁸⁴ Shipment by U-boat would be consistent with the difficulty of overland travel and material shipment from Germany to Spain.

⁸⁵ NAS Record Group 76 (note 25), Box 3, Exhibit 320, no. 66, 24 Apr. 1915

⁸⁶ NAS Record Group 76 (note 25), Box 3, Exhibit 320, no. 178, 11 Feb. 1917.

⁸⁷ Geissler (note 2).

It is clear that Berlin was actively directing the Argentinian programme (Madrid was involved principally as a communications relay station in a neutral country from which secret agents and cultures could travel to South America.) This is in contrast to the operation of the programme in the USA, for which Dilger apparently had delegated authority. It is noteworthy that Dilger appears to have been in Berlin when the programme in Argentina was being initiated; whether he had any role in this programme is unknown.

The effectiveness of the biological sabotage programme in Argentina is, like its North American and European progenitors, impossible to assess. Certainly Wuppermann (Arnold) evaluated his work quite highly, claiming large numbers of animal casualties and a complete interruption of shipments of horses and mules to the Allies. However, his obvious self-interest makes it impossible to accept his assessment without considerable scepticism. Jones has claimed⁸⁸ that the combination of decryptions of intercepted telegrams and British infiltration of the German spy network in Argentina effectively neutralized it. He claims that only 200 animal deaths are attributable to biological sabotage in South America.

Furthermore, if the logistical chain for sabotage cultures outlined by Beesly is correct, it is quite possible that Wuppermann (Arnold), as perhaps Dilger before him, was using non-viable cultures. It appears that the doctored sugar cubes were manufactured in Germany, shipped (probably by rail) to Pola, taken to Cartagena by U-boat, then to Buenos Aires on a commercial steamship. Possibly they were held for some time at intermediate points waiting for a convenient opportunity for shipping further. By the time Wuppermann used them, the cultures could have been many months old and quite likely dead. Wuppermann apparently failed to establish a reliable culture facility in Argentina. In January 1917, Madrid cabled Berlin that 'Arnold indicated difficulty with production of xxxx [garbled in transmission— perhaps 'E and B'?] and asks that we send a specialist. Army physician Dr. Wäle, trained by Professor Kleine, can be sent to Buenos Aires'.⁸⁹

VIII. Other possible German biological attacks in World War I

Italy was apparently also considered as a target. In May 1915 Nadolny requested information from the military attaché in Rome on 'where large stocks of military horses are located'.⁹⁰ However, there is no evidence that this interest went any further.

Later in the war there was sporadic use of biological weapons for sabotage behind the lines on the Western front. On 26 March 1917, the French General Headquarters issued a communiqué:

A German agent arrested in our military zone was found to be carrying suspect material, and confessed to having been charged with initiating an epidemic of glanders

⁸⁸ Jones (note 62), p. 181.

⁸⁹ Original: 'Arnold meldet Schwierigkeiten bei Herstellung von Esommerus [noted in the margin: 'so gekommen'] erbittet Hinsendung eines Fachmannes. Schutztruppen-Stabsarzt Dr. Wäle, durch Professor Kleine ausgebildet, kann nach Buenos Aires gesandt werden'. Kaiserlicher Geschäftsträger, Telegramm an Auswärtiges Amt [für Großer Generalstab Politik], Entzifferung, PAAA R 21241, 6 Jan. 1917, p.36.

⁹⁰ 'An welchen Orten sich grosse Bestände von Militärpferden befinden'; see Geissler (note 2) for details.

among the horses of the French cavalry. The equipment consisted of a metal tube enclosing an elongated glass vessel containing a liquid culture of [the agent of] glanders, and a brush fixed at the end of a metal wire rolled twice at its [other] end into a finger grip. The agent had received the following instructions: use the culture either by pouring it on horse feed just before it is eaten, or by brushing it on the horses' nostrils.⁹¹

Note the new method of inoculation: brushing the culture onto the targeted animal's nostrils,⁹² rather than penetrating the skin with a needle, or feeding doctored sugar cubes. This would certainly be safer for the agent than a needle; whether it was more effective in transmitting disease could only have been known from experiment.

General Romieu also claims that another communiqué reported similar attempts at several locations.⁹³ A further communiqué reported the capture of a laboratory suspected of supplying cultures for sabotage.⁹⁴ There is no evidence that these attempts to infect French or Norwegian animals had any significant effect (or indeed that any were consummated).

IX. Biological sabotage efforts by other countries

It appears that France also had a biological sabotage programme. Certainly the German General Staff believed that Germany was itself the victim of biological attack by France. A secondary source claims that in 1916 Germany learned that the French secret service was engaged in infecting horses in Switzerland that were to be shipped to Germany. The biological agent was alleged to have been glanders.⁹⁵

French prisoners of war (POWs) may also have been involved in biological sabotage. Twice they were found in possession of microbial cultures, or were the recipients of parcels containing them.⁹⁶ In May 1917, a parcel addressed to a POW at a camp in Puchheim was found to contain, hidden in a tin of marmalade, ampoules of culture and directions for their use on cattle and pigs. Although the cultures were sent for analysis, the results are not reported (anthrax would be most likely as it is the only agent Germany is known to have used to which these two species are susceptible). In another 1917 incident an escaped POW was found on recapture to be carrying a tube of toothpaste contaminated with the aetiologic agent of glanders.⁹⁷

The existence of a French programme is confirmed by the minutes of the 18 May 1923 meeting of the government's Commission de Bactériologie

⁹¹ Communiqué no. 4367 of 26 Mar. 1917, cited by Romieu, 'La guerre microbienne' [The microbial war], *Revue des Deux Mondes*, vol. 23 (1934), pp. 41–58, author's translation.

⁹² It is this method that Kliewe (quoted above; see note 32) anachronistically attributes to the operations in Romania and the USA.

⁹³ Unnumbered communiqué of 6 June 1917, cited by Hugh-Jones, M., 'Wickham Steed and German biological warfare research', *Intelligence and National Security*, vol. 7, no. 4 (1992), pp. 379–402.

⁹⁴ Communiqué no 43137 of 30 Oct. 1918, cited by Hugh-Jones (note 93).

⁹⁵ von Bose, H., 'Sabotage und Propaganda' [Sabotage and propaganda], eds P. von Lettow-Vorbeck, L. Altmann and B. von Bismarck, *Die Welkkriegsspionage* (Justin Moser: Munich, 1931), pp. 301–11.

⁹⁶ Geissler (note 2).

⁹⁷ Stellvertretender Generalstab IIIb to the Kriegsministerium, 'Betreff: Sabotage durch Rotzbazillen' [re sabotage through glanders], KA 12919, 20 July 1917; and Bastian, Zentralpolizeistelle Bayern, to the Staatsministerium des Inneren, 'Betreff: Sabotage durch Kriegsgefangene' [re sabotage through prisoners of war], KA 12919, 20 Aug. 1917.

(created in 1922 by the Ministry of War), in which Veterinary Inspector Guy Vallée confirmed that during the war he had occasion to use 'virus' harmless to humans but easily transmissible to horses, where it caused an infectious anaemia. The agent was to be used against enemy cavalry animals by putting capillary tubes containing the agent into fodder, to shatter and release the contained microbes when eaten.⁹⁸

These reports confirm that France had a programme of biological sabotage directed against Germany. However, further research in the French archives at the Service Historique de l'Armée de Terre in Vincennes is needed to determine its nature, magnitude and details.

X. The end of World War I

The German biological sabotage programme was apparently largely abandoned before the end of the war. In 1941 Kliewe wrote:

Glanders bacilli were actually used in Rumania and America by the methods outlined in the literature quoted; with good success. For example, all horses of one transport from America to England had to be thrown overboard because the animals were diseased with glanders. During the last part of the World War the activity of agents was to be increased, but since objections were raised repeatedly and several agents were arrested by the Allies, the project was abandoned.⁹⁹

Cancellation of the programme was probably a consequence both of the capture of agents on the French front and of the collapse of the ability to effectively transport agents and cultures to the western hemisphere in 1918. In any event, it appears that by the end of the war the biological sabotage programme had largely petered out, although Dilger seems to have been desirous of resurrecting it.

The fighting ended on 11 November 1918, with the signing of the armistice. A formal conclusion to the war came later, with the signing of a series of nearly 40 treaties, protocols, declarations and agreements produced by the negotiations of the Paris Peace Conference. The central treaty was the June 1919 Treaty of Peace Between the Allied and Associated Powers and Germany,¹⁰⁰ commonly known as the Treaty of Versailles.

Section V of the treaty dealt with the German military; it contained a specific prohibition on German use, manufacture or importation of 'asphyxiating, poisonous or other gases and all analogous liquids, materials or devices' (Article 171),¹⁰¹ and required all existing stocks to be destroyed (Article 172). There was no mention of biological or bacteriological weapons here or elsewhere. This strongly suggests that both the military commanders who drew up

⁹⁸ Lepick, O., Private communication with the author, 3 Dec. 1996. The identity of the agent is obscure. Vallée could have been using the term 'virus' in its old sense of a harmful substance, perhaps thereby referring to a bacterial agent such as glanders.

⁹⁹ Kliewe (note 32).

¹⁰⁰ Treaty of Peace Between the Allied and Associated Powers and Germany, signed at Versailles on 28 June 1919, entered into force 10 Jan. 1920. United States Government, *The Treaty of Versailles and After: Annotations of the Text of the Treaty* (US Government Printing Office: Washington, DC, 1944).

¹⁰¹ This is the first appearance of this particular wording, best known from the Geneva Protocol a few years later. Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, signed at Geneva 17 June 1925, entered into force 8 Feb. 1928. The text of the protocol is available at the SIPRI Internet web site URL <<http://www.sipri.se/cbw/docs>>.

the terms of the armistice and the heads of state and their advisors who drew up the Treaty of Versailles were unaware of the extensive biological sabotage effort, or that they did not take it seriously.

In fact, probably few outside of military intelligence knew much; and almost certainly no one outside of Germany had more than a part of the picture. Everyone was aware of the microbes in the garden in Romania (it was a matter of widespread discussion in the press and in diplomatic circles at the time); however, no one seems to have realized that sabotage had been going on for some time. France also knew of instances of attempted sabotage on the Western front (and, of course, they may have had their own programme of biological sabotage). The UK was aware of the programme in Argentina but apparently thought it ineffective. Probably no one knew of the programme in the USA at this time, largely because it seems not to have been a topic in the secret German radio correspondence, so successfully intercepted and decoded by Britain. This is presumably because it was being run directly on-site by a representative of the General Staff (Dilger), unlike the programme in Argentina, run from Berlin. It was only in the early 1930s, in the course of the civil investigation of the sabotage programme conducted for the Mixed Claims Commission hearings, that the dimensions of the programme in the USA became known.

Because of the fragmentary nature of the information available to any one government, and the picture those fragments may have painted of a few ineffectual attempts to infect animals, it is quite possible that deliberate infection never appeared to be a weapon of any potential. This judgement would have confirmed preconceptions in Britain at least. During the war, the British military had apparently considered biological warfare and concluded that it was not feasible.¹⁰²

On the German side the situation was, of course, very different. On the General Staff there would have been officers who had a fairly complete picture of the scope of the programme and who probably believed it to have been successful. However, these officers may have been released from the military or dispersed back to their parent services in the reorganization of the German military command structure dictated by Article 160 of the Treaty of Versailles. That reorganization drastically reduced the size of the officer corps, sharply limited the size of forces that could come under a single command and dictated: 'The Great German General Staff and all similar organizations shall be dissolved and may not be reconstituted in any form'.

Despite the draconian conditions of the Versailles Treaty and the presence of the large and intrusive Inter-Allied Control Commission conducting on-site compliance inspections, Germany was able to evade many of the requirements imposed upon it. In particular, the General Staff was reconstituted as the *Truppenamt* ('troop office'), with its intelligence section surviving as the *Abwehrabteilung* ('counterintelligence section', commonly shortened to *Abwehr*). Only about 60 officers were assigned to the *Truppenamt* in the immediate post-war period (in contrast to the several hundred on the General Staff),¹⁰³ a mere four

¹⁰² Committee of Imperial Defence, Chiefs of Staff Subcommittee, Minutes of the 118th Meeting, Held on February 12th, 1934, PRO CAB 53/4. 253–72, p. 17.

¹⁰³ Goerlitz (note 5), p. 218.

of whom staffed the Abwehr.¹⁰⁴ The officers most directly in charge of the sabotage programme clearly continued in positions of authority, although not necessarily in the Truppenamt itself. Rudolf Nadolny was prominent as a diplomat in the post-war years,¹⁰⁵ and Hans Marguerre was the chief of Department II (foreign department) of the Abwehr in World War II.¹⁰⁶

It is probable that most of the documents of Nadolny's Political Section were destroyed at the end of the war to keep them out of the hands of the revolution that toppled Kaiser Wilhelm II and brought in a republican government. Marguerre is reported to have personally, with the help of some loyal officers, burned all documents of the unit in the basement of the General Staff building.¹⁰⁷ Nadolny himself, much later, confirmed their destruction.¹⁰⁸

The destruction of documents regarding the biological sabotage programme, and the loss of officers with first-hand knowledge of it, probably reduced the extent to which it could be used as a model for later activities. Certainly the biological warfare programme, such as it was, that emerged between the world wars was very different from that of World War I. It contemplated strategic use in war; the focus was on anti-human agents; and aerial delivery was assumed.¹⁰⁹ Although it is unclear to what extent this conception was implemented (it was quite possibly very modest), it is clear that there was a marked change in the concept of biological warfare. There is no mention of the World War I programme in post-war documents, and this kind of clandestine sabotage received little consideration. The focus seems to have shifted entirely.

XI. Conclusions

The documentation cited here makes it clear that from 1915 to 1918 Germany mounted an ambitious programme on three continents of veterinary sabotage against neutral suppliers of its enemies and against potential and actual adversaries. The programme began with nearly simultaneous operations in Romania, the USA and probably Spain in the summer and autumn of 1915. Operations in Argentina and Norway began later, perhaps as early as summer or autumn 1916. The operations in Romania, the USA and probably Spain ended in late summer or autumn 1916; operations in Norway apparently only lasted a few months, until January 1917. However, the programme in Argentina appears to have persisted into 1918. In addition to these sustained operations, several unsuccessful attempts were made.

This German programme is of particular interest for several important reasons. It was: (a) the first national programme of offensive biological warfare; (b) the first biological warfare programme of any kind with a scientific

¹⁰⁴ Whaley, B., *Covert German Rearmament, 1919–1939: Deception and Misperception* (University Publications of America: Fredrick, Md, 1984), p. 21.

¹⁰⁵ Ironically, Nadolny was involved in negotiating the Geneva Protocol, which prohibits the wartime use of biological weapons.

¹⁰⁶ Geissler (note 76).

¹⁰⁷ Gneist (note 42), pp. 1–4.

¹⁰⁸ Nadolny, R., 'Privatbrief an F. von Papen, 15.12. 1952' [Private letter to F. von Papen, 15.2.1952], PAAA Nadolny Nachl, vol. 9, p. 543. The IIIB files quoted above regarding the Romanian programme were apparently copies in the Foreign Ministry that escaped destruction. It is certainly possible that other such copies will eventually be discovered, providing a more complete documentary record of the activities of Nadolny and the Political Section.

¹⁰⁹ Hugh-Jones (note 93), pp. 379–402; and chapter 6 in this volume.

foundation; (c) one of only two confirmed instances of an actual programme of wartime use of biological agents (the World War II Japanese programme against the Chinese was the other¹¹⁰); and (d) the first and perhaps only large-scale trial of clandestine biological attack by secret agents (an often discussed scenario). Notably, this first systematic biological offensive was directed against neutrals not belligerents, and targeted animals not humans. Both types of use remain serious threats.

Unfortunately, there is no information on its genesis. It is tempting to speculate that it was a product of the exceptionally strong traditions of microbiology and veterinary science in Germany in the early part of the 20th century, but there is no evidence of this. However, that the programme in its operational phase was overseen directly by the General Staff suggests a well institutionalized programme, which may have had close ties to the German veterinary and microbiology communities.

Only one person with medical or veterinary training is known to have been affiliated with the programme: Dr Anton Dilger.¹¹¹ Dilger was trained as a physician, and English and US intelligence reports claim (without documentation) that he held the rank of colonel in the German Army.¹¹² He was clearly affiliated with the Political Section of the General Staff from at least early 1915, and he could have been involved before that. He was in Germany during the programme's development phase; he had full operational responsibility for the programme in the USA. He was back in Germany when the programmes in Argentina and Norway were initiated, and he is known to have some microbiological training. He successfully established a culture family in Washington, and he was in Germany when microbes were produced there for use in Argentina, Norway and Spain and when new culture methods were developed. It is thus quite possible that he played a central role in the programme from the outset.

Certainly the programme required a period, even if brief, of R&D. Biological agents must have been considered and tested, methods of growing and harvesting them piloted, 'shelf life' of microbial cultures measured, inoculation methods tested, and equipment suitable for clandestine field use designed and tested. This effort could have been relatively brief, as the diseases involved were well studied. Nevertheless, a systematic approach would have required an R&D phase of several months at a minimum. Whether it was conducted by Dilger himself, by the army or by academic institutions is of great interest, but on this question there is unfortunately no information. That several new methods were developed during the war suggests a continuing R&D effort.

The programme seems to have been aimed largely at neutral countries (Argentina, Norway, Romania, Spain and the USA) in order to interfere with their commerce with enemy belligerents. Towards the end of the war the programme was expanded to include attempts at biological sabotage behind the front lines, but this tactical usage seems to have been almost immediately discontinued after the capture of several agents.

¹¹⁰ Chapter 7 in this volume.

¹¹¹ Herman Wuppermann is termed 'Dr' in German records, but the nature of his training is not specified, and there is no reason to assume that it was relevant to the programme. The evidence suggests he was not capable of independently culturing bacteria.

¹¹² NAW Record Group 165, Records of the WFGS, Military Intelligence Division Correspondence 1917-1941, Personal File 19368.

Because the sabotage was aimed at animals penned prior to shipment, multiple acts of biological aggression were required to infect successive shipments and those from different locations. This, of course, increased the risk of detection greatly, although secret agents were surprisingly successful in evading capture.

It also required substantial amounts of culture for repeated operations, which was provided in different ways. In the USA, inoculum was shipped from Germany and subcultured in a clandestine laboratory established in the target country. Multiple shipments of biological ammunition were apparently made from Germany to Argentina, Norway, Romania and Spain for use directly. Both approaches impose requirements (the operation of a clandestine laboratory or repeated shipments of biological material) that carry a significant risk of detection, and both have their own particular microbiological complications. The first requires substantial microbiological expertise at the target-site to ensure that cultures are maintained viable and free of contamination; the second requires timely logistics to maintain culture viability during transport from their distant sites of production. This suggests that covert attack on the animal or plant resources of a country may often present substantial difficulties, unless conditions predispose to a widespread epidemic from a single focus.

The involvement of the General Staff in direct oversight of the programme is certain. Microbial cultures were shipped from Germany to agents in Argentina, Norway, Romania and the USA on a number of occasions, probably by U-boat in several instances. When Dilger returned to Germany from the USA, he met with Rudolf Nadolny, Director of the Political Section of Department IIIB, as did other principals of the US programme. Nadolny himself directed the Romanian attempt and the General Staff ran the programmes in Argentina and Spain directly from Berlin. It is not clear how far up the military command hierarchy there was detailed knowledge of the programme. There is no evidence that the Supreme Command, or the Kaiser, knew of the biological sabotage. However, it seems likely that at least the policy decision to proceed with such an ambitious and potentially embarrassing programme came from much higher up than captain and section chief level.

It is impossible to determine the result of the programme. The German operatives clearly thought it a success; however, there is no documentary evidence to support this conclusion.

It is a puzzle that this programme, apparently viewed as successful by the German Army, did not provide a model for further development when Germany came to consider biological warfare in the inter-war years. In the German documents on biological warfare from the 1920s and 1930s there is no mention of the biological sabotage programme, despite occasional mention of the possibility of using secret agents to perform clandestine biological warfare operations in enemy territory.¹¹³ It seems that, after the war, thinking about biological warfare became preoccupied with strategic and defensive questions and focused on anti-human agents to a much greater extent. The veterinary sabotage programme of World War I may not have been forgotten; it may simply have become irrelevant.

¹¹³ See chapter 6 in this volume.

Although most is known about the German programme, France appears to have had a similar one, and Britain appears to have considered biological warfare but rejected it as impractical. It thus seems that at the time, a few decades after the spectacular rise of microbiology that so revolutionized medicine and veterinary medicine, biological warfare was an obvious possibility.

It is therefore puzzling that biological weapons were not mentioned in the armistice, the Treaty of Versailles or in disarmament negotiations in Geneva prior to 1925. It is probable that at least two factors contributed to this invisibility: the fragmentary nature of the information available to any one country and its negotiators; and the fact that the programme(s) did not target humans. Indeed the Geneva Protocol,¹¹⁴ as it was finally worded, arguably would not have applied to much of the German World War I programme had it been in force at the time, limited as the protocol is to 'prohibiting the use in war' of 'bacteriological methods of warfare' (which, as demonstrated above, could easily be construed to apply only to anti-human agents). A clandestine programme of attack on animals in neutral countries was clearly not among the scenarios envisaged by the negotiators at Geneva. Nevertheless, the unacknowledged awareness among many of the negotiators of the existence (although not the scope) of German biological sabotage may have made for a receptive climate when Poland proposed the inclusion of a prohibition on biological warfare in the draft protocol.¹¹⁵ To a modest extent, then, the inclusion of biological warfare in the Geneva Protocol may be among the legacies of this first systematic effort at modern biological warfare.

¹¹⁴ Geneva Protocol (note 101); see also chapter 4 in this volume.

¹¹⁵ Chapter 4 in this volume.